for the tobacco plant, and on the application of magnesia in the form of magnesium sulfate for the rice plant. UYEDA gives an extended account of a new phytopathological bacterium (*Bacillus Nicotianae*) which produces a serious disease known as stem-rot and black-leg of tobacco. HORI gives an account of a smut on the cultivated bamboo. The fungus attacks the young internodes of growing branches, and as it may infect these at any time during the growing season, whole forests of bamboo often become infected. As the bamboo furnishes material for building as well as for household utensils and fences, the damage thus caused is considerable. The fungus is referred to *Ustilago Shiraiana* P. Henn.—H. HASSELBRING.

Respiratory enzymes.—PALLADIN announces his adherence to the theory of BACH and CHODAT, that normal respiration depends upon the presence of 1) oxidizable substance and 2) two enzymes, whose mixture was formerly designated oxidase, *a*) oxygenase, which has, attached to various radicals, the characteristic peroxid or hydroperoxid group O·O or O·OH and serves to transfer O_2, and *b*) peroxydase, which is a catalyser and renders active the oxygenase. When oxidative processes do not occur it is because one or two of the three are wanting. The less stable oxygenases, and those which with water quickly become hydroperoxids, are used up promptly, giving rise to some of the respiratory CO_2; so that often tests do not show any "oxidase" present in plant parts; but the peroxidases, which are very stable, can always be found.

From his researches PALLADIN concludes[9] that the prevalence of one or the other enzyme is connected with the stage of development of the plant. For anaerobic respiration prevails in embryonal organs and in lower plants, which alone are capable of anaerobic life. In the embryonal stage oxygenase is at a minimum, increasing with the passage into active life, and diminishing in organs which have ceased to grow.

Miss KRASNOSSELSKY,[10] working under PALLADIN'S direction, finds in frozen onions and their sap no oxygenase, but peroxydases whose quantity increases with respiratory activity, if H_2O_2 be supplied, and continues to do so even when respiration falls. Katalase, however, is present in the sap after the freezing.

These researches are more and more justifying the opinion that the origin of "respiratory" CO_2 is very complex, and that more than one catalyser is taking part in the dissociation.—C. R. B.

Ancient history of ferns.—ARBER[11] has brought together the recent development of knowledge in reference to the history of ferns in a short paper that brings

[9] PALLADIN, W., Bildung der verschiedenen Atmungsenzyme in Abhängigkeit von dem Entwicklungstadium des Pflanzen. Ber. Deutsch. Bot. Gesells. **24**:97–107. 1906.

[10] KRASNOSSELSKY, T., Bildung der Atmungsenzyme in verletzten Zwiebeln von *Allium Cepa*. Ber. Deutsch. Bot. Gesells. **24**:134–141. 1906.

[11] ARBER, E. A. NEWELL, On the past history of ferns. Annals of Botany **20**: 215–232. 1906.

the important facts well in view, however opinions may differ as to some of the conclusions. It is shown that the fern-like Cycadofilices, later called Pteridosperms, were a dominant group of the Carboniferous; but that the evidence for the existence of ferns in the modern sense is at present very uncertain. For any Carboniferous fern-like plants that may prove to be true ferns the author suggests the name *Primofilices*, since to distinguish among them definite eusporangiate and leptosporangiate habits is impossible. In fact, all the so-called "fructifications" of Paleozoic "marattiaceous ferns" may prove to be the microsporangiate structures of Pteridosperms. Until this is determined, the existence of eusporangiate ferns in the Paleozoic as a dominant group must remain uncertain. This also means that the old question as to whether the eusporangiate or the leptosporangiate type of ferns is the more primitive has lost its apparently sure answer from history. In fact, while the author gets sure evidence of leptosporangiate ferns in the Permian, he does not find similar satisfactory evidence of eusporangiate ferns until the Tertiary; although in both cases he recognizes the possible Paleozoic occurrence. As to the water ferns, the evidence of their existence does not become clear until the Tertiary. The claims for them in the Paleozoic are so much in conflict with all morphological testimony that they have never seemed to be very serious. The general conclusion in reference to the ferns seems to be that while Pteridosperms are a dominant group in the Paleozoic; and the Cycadophyta are one of the dominating groups of the Mesozoic; there is no evidence at present of the dominance of any fern group except that of the leptosporangiates in the Mesozoic and continuing into the present flora.—J. M. C.

Spores of Riccia glauca.—BEER[12] has investigated the development of the spores of *Riccia glauca*, contrasting his results with those of GARBER[13] on *R. natans*, and of LEWIS[14] on *R. crystallina*. The spore mother cells are at first separated by extremely delicate membranes in which no cellulose could be demonstrated, and upon them secondary and tertiary thickening layers are deposited which give pectose-cellulose reactions. The secondary layer becomes more or less mucilaginous, sometimes separating completely from the primary wall, at other times remaining partly adherent and becoming drawn out into strands bridging the space between the primary wall and the tertiary layer. No nutritive material was found between the isolated mother cells, and no non-nucleated reticular resting nucleus was found. The large deep-staining nucleolus consists of a number of deeply chromatic granules embedded in a faintly staining matrix. A long and well-marked spirem thread occurs in the prophase of the division of the mother cell. The reduced number of chromosomes is 7 or 8. In telo-

[12] BEER, RUDOLF, On the development of the spores of *Riccia glauca*. Annals of Botany **20**:275–291. *pls. 21–22*. 1906.

[13] BOT. GAZETTE **37**:161–177. 1904.

[14] BOT. GAZETTE **41**:109–138. 1906.